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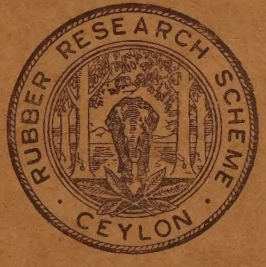
Rubber Research Scheme (Ceylon)

Third Quarterly Circular
for 1941.



September, 1941.

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Office and Laboratories.—Dartonfield Estate, Agalawatta, Ceylon.

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DARTONFIELD ESTATE—VISITORS' DAYS

The second and fourth Wednesdays in each month have been set aside as Visitors' Days at Dartonfield Estate, and the services of technical officers will be available to visitors on those days. The estate superintendent will be available every Wednesday. Visitors are requested to arrive on the estate not later than 9.30 a.m.

While visitors will be welcomed at the Station on other days, any particular member of the staff may not be free to give them attention unless an appointment has been made.

Dartonfield Estate is situated about 3½ miles from the main Matugama-Agalawatta Road, the turn-off being near culvert No. 14/10. The distance from Colombo is approximately 47 miles.

PUBLICATIONS

Rubber Research Scheme publications comprising Annual Reports, Quarterly Circulars and occasional Bulletins and Advisory Circulars are available without charge to the Proprietors resident in Ceylon), Superintendents and Local Agents of Rubber estates in Ceylon over 10 acres in extent. Forms of application for registration may be obtained from the Director. Extra copies of publications can be supplied to the Superintendents of large estates for the use of their assistants.

ADVISORY CIRCULARS

The former issue of cyclo-styled Planting Memoranda have been replaced by printed Advisory Circulars. The undernoted Circulars may be obtained on application at 25 cents per copy. Future issues in the series will be sent free of charge to estates registered for the receipt of our publications :—

(1) Notes on budgrafting procedure.

(2) Programme of manuring for replanted Rubber clearings (May, 1940).*

* Now being revised.

(3) Notes on Rubber seedling nurseries (November, 1939).

(4) Contour lining, holing and filling, cutting of platforms, trenches and drains (June, 1939).

(5) Straining box for latex (January, 1940).

(6) Notes on the care of budded trees of clone Tjirandji 1 with special reference to wind damage (September, 1938).

(7) Notes on procedure and equipment at Dartonfield Estate factory (May, 1940).

(8) Planting and after-care of budded stumps (January, 1940).

(9) The preparation of latex for shipment (May, 1940).

(10) Root disease in replanted areas (August, 1939).

(11) Emergency rubber coagulants (May, 1940).

(12) Warm air drying house for crepe rubber (May, 1940).

(13) Notes on the preparation of clean rubber (May, 1940).

(14) Rat Control (September, 1940).

FIELD EXPERIMENTS ON DARTONFIELD ESTATE—XV.

COMPARISON OF TAPPING SYSTEMS (1940)

C. A. de SILVA, *Assistant Botanist*

This paper presents the results of a tapping experiment with mature seedling Rubber on Dartonfield for the tapping year, March, 1940 to February, 1941. The results of the first three years of the experiment were given in the following publications :—

1. *Second Quarterly Circular* for 1939 (Vol. 16, Part 2).
2. *Third Quarterly Circular* for 1940 (Vol. 17, Part 3).

Experimental Details

FOR full details of the experimental design, tapping and recording arrangements, etc., the reader is referred to the earlier publications mentioned above. The layout is in six randomised blocks, each unit plot consisting of 30 trees.

The methods of tapping under comparison are given below, the abbreviations being in accordance with revised version of the International Standard Notation :—

Two-day series

1. Half spiral on alternate days, with change of panel every six months. Bark consumption 5½ inches per annum. (S/2, d/2, (2×6m/12), 100%.
2. Ditto with cycle of periodic rest, tapping for twelve months and resting for six months. Bark consumption 3¾ in. per annum. S/2, d/2, (2×6m/12), 12m/18, 67%.
3. Half spiral on alternate days, but on alternating sides, *i.e.*, the tree is tapped on alternate days and each cut once in four days. Bark consumption 7 in. per annum. S/2, d/2, (2×2d/4), 100%.

Two-day series

4. Two quarter spirals in echelon on alternate days, the bottom of the left cut being 6 in. below the top of the right. Change of panel every six months. Bark consumption 5½ in. per annum. S/4//S/4, d/2, (2×6m/12), 100%.

5. "Double-Four," *i.e.*, two opposite half spiral cuts once in four days. Bark consumption 7 in. per annum. S/2+S/2, d/4, 100%.

6. Ditto with cycle of periodic rest, tapping for twelve months and resting for six months. Bark consumption 4¾ in. per annum. S/2+S/2, d/4, 12m/18, 67%.

Three-day series

7. Half spiral once in three days, with change of panel every six months. Bark consumption 4½ in. per annum. S/2, d/3, (2×6m/12), 67%.

8. "Double-Three" *i.e.*, two opposite half spiral cuts once in three days. Bark consumption 9 in. per annum. S/2+S/2, d/3, 133%.

9. Ditto with cycle of periodic rest, tapping for six months and resting for six months. Sometimes known as Sunderland system. Bark consumption 4½ in. per annum. S/2+S/2, d/3, 6m/12, 67%.

10. Ditto with cycle of periodic rest, tapping for twelve months and resting for six months. Bark consumption 6 in. per annum. S/2+S/2, d/3, 12m/18, 89%.

11. Ditto with cycle of periodic rest, tapping for eight months and resting for four months. Bark consumption 6 in. per annum. S/2+S/2, d/3, 8m/12, 89%.

The usual Ceylon custom of resting for three or four weeks during the annual period of refoliation is followed, so that the tapping year actually consists of about 11 months. In the periodic systems the periods of tapping and rest are adjusted accordingly so that, for example, 12m/18 should really read 11m/16½.

Results

Except for an additional graph and table, the results are expressed in a similar form to those of previous years. Comments are submitted on the outstanding features of the results.

Yields.—The yields of the various tapping systems for the experimental year 1940/41, and those of the uniformity trial 1936/37, are given in Table I in kilograms of dry rubber per plot of 30 trees, together with the yields of the former, after adjustment for the initial yield differences in the uniformity trial. An approximate conversion factor for expressing the results in lbs. per acre is $\times 7$. The proportion of scrap (tree scrap only) expressed as a percentage of the total crop is included in the same table. The figures are higher than might be expected in commercial practice owing to the exclusion of partial "washouts" from the experimental results and the percentages being based on total yields.

The yield of system No. 1 (S/2, d/2, 100%), which showed a marked decline in 1939/40, as compared with the previous year, remains at the same level in 1940/41. Careful examination of the conditions in the field and experimental procedure has failed to reveal a reason for this relative drop in yield. As a result the systems of the same intensity show a considerable increase over the control system No. 1, the increase in the "Double Four," system (2S/2, d/4, 100%), reaching the lower level of significance in 1940/41. It would be unwise, however, to assess the economic significance of this increase at this stage. The figures in the last column of Table II, which refer to the full period 1937/41, afford a more reliable guide to the relative yields of the various systems, as abnormal fluctuations become smoothed out over a period of years. In this respect the increase of 17% in yield of the "Double Three" system is real and significant. The satisfactory yield of the "Double Three" system after 4 years' tapping is an outstanding feature of the results and is of particular interest at the present time, when maximum estate output is called for. It has been suggested that this system can safely be adopted as a means of obtaining increased crop, for a limited period, on estates in wet low-country districts, which have good bark reserves, subject to the proviso that it may be necessary to give the trees a corresponding rest at a later stage. Its adoption on estates which are already depleted of bark reserves might, however, cause permanent damage to the trees.

The less intensive methods of tapping continue to show a substantial increase over the theoretical expectation of yield, confirming the benefit of a periodic rest or increased interval of tapping.

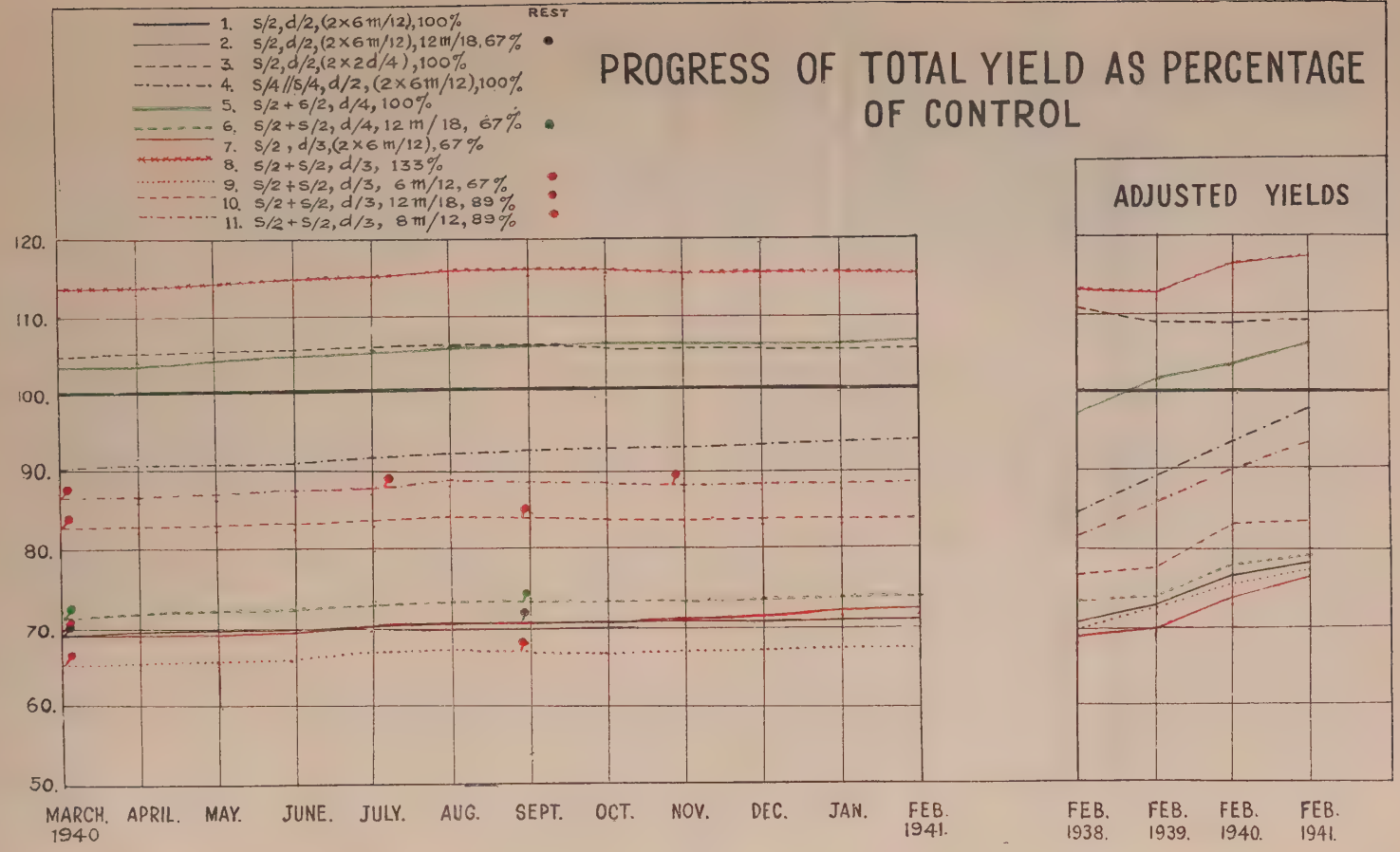
The progress of the total yields from the various systems as a percentage of No. 1, is illustrated in the graph facing page 61, each point representing the cumulative yield up to that stage. These yields have not been adjusted by a regression, and therefore the positions as at February, 1941, do not quite conform to the figures in the last column of Table II. A subsidiary graph giving the adjusted percentages at the end of each tapping year is reproduced on the right.

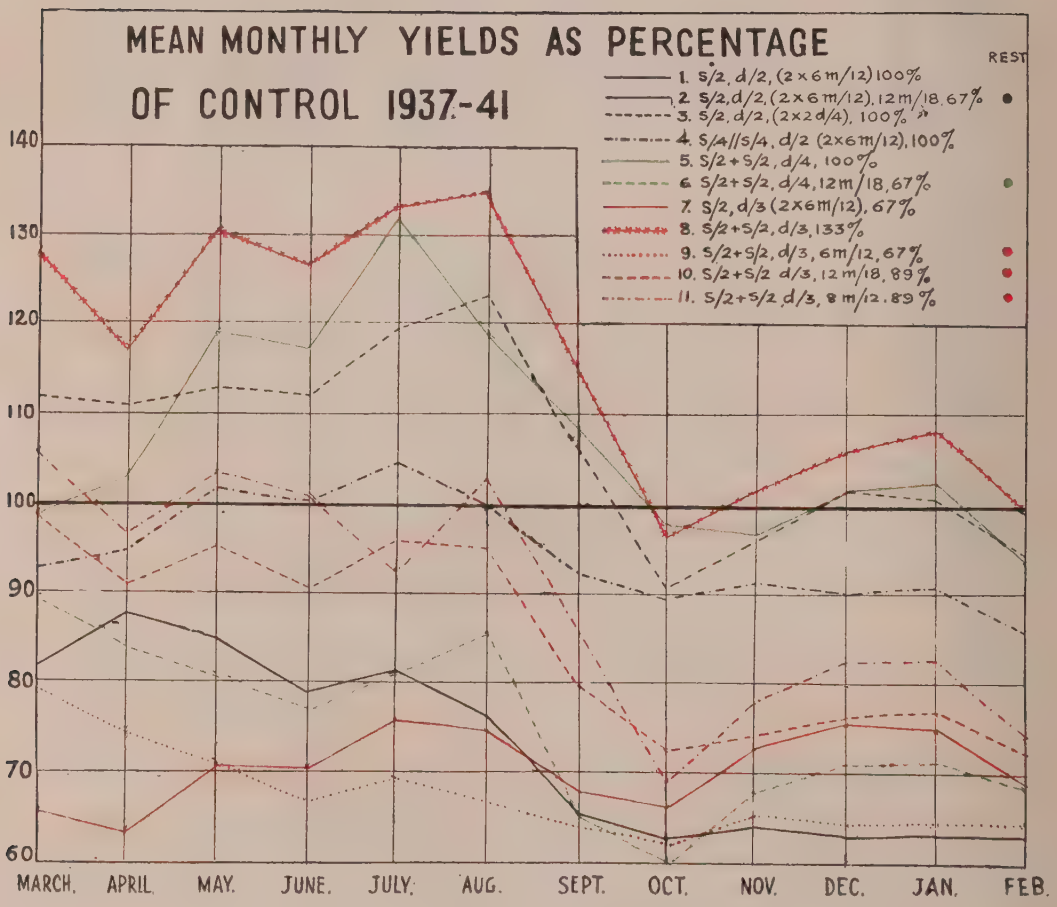
The average monthly yields of the various systems for the four-year tapping period 1937/41 are given in Table III. The yields expressed as a percentage of system No. 1, are also shown in the table. It will be seen from the table that the extra crop from systems which give a higher nett yield than the control is mainly obtained during the first six months of the tapping year. During the flush months in the latter part of the year the yield from system No. 1, reaches a more pronounced peak and approximates to that of the other systems concerned. This is clearly brought out in the graph facing page 62, which shows the monthly yields expressed as percentages of control. It should, however, be noted that a change of tapping panel is made in system No. 1 in September, and it is possible that the apparent alteration in the relative yields really arises from a fortuitous difference in the level of yield from the two panels. It would, therefore, be unwise to attach undue weight to this factor at present, especially as a seasonal change in relative yields under different systems, if real, might be substantially modified under slightly different climatic conditions.

Dry Rubber Content.—The mean monthly figures for the dry rubber content of latex are given in Table IV., and the annual yields in Table V.

As in previous years the figures do not show important fluctuations from month to month, and the differences in rubber content between the various systems of tapping in 1940/41 are not significant. The fact that the rubber content under tha "Double Three" system remains at a satisfactory level is reassuring, and indicates that the system does not throw an undue strain on the tree.

Bark Renewal.—The progress of the renewal of bark since February, 1937 is shown in Table VI. The last column gives the increment figures for the four-year period. The rate of renewal


PROGRESS OF TOTAL YIELD AS PERCENTAGE OF CONTROL
ADJUSTED YIELDS
REST
1. S/2, d/2, (2×6m/12), 100%
2. S/2, d/2, (2×6m/12), 12m/18, 67%
3. S/2, d/2, (2×2d/4), 100%
4. S/4 // S/4, d/2, (2×6m/12), 100%
5. S/2 + 6/2, d/4, 100%
6. S/2 + S/2, d/4, 12m/18, 67%
7. S/2, d/3, (2×6m/12), 67%
8. S/2 + S/2, d/3, 133%
9. S/2 + S/2, d/3, 6m/12, 67%
10. S/2 + S/2, d/3, 12m/18, 89%
11. S/2 + S/2, d/3, 8m/12, 89%
120.
110.
100.
90.
80.
70.
60.
50.
MARCH. 1940
APRIL.
MAY.
JUNE.
JULY.
AUG.
SEPT.
OCT.
NOV.
DEC.
JAN.
FEB. 1941.
FEB. 1938.
FEB. 1939.
FEB. 1940.
FEB. 1941.


MEAN MONTHLY YIELDS AS PERCENTAGE
OF CONTROL 1937-41
REST
1. S/2, d/2, (2×6m/12) 100%
2. S/2, d/2, (2×6m/12), 12m/18, 67%
3. S/2, d/2, (2×2d/4), 100%
4. S/4//S/4, d/2 (2×6m/12), 100%
5. S/2+S/2, d/4, 100%
6. S/2+S/2, d/4, 12m/18, 67%
7. S/2, d/3 (2×6m/12), 67%
8. S/2+S/2, d/3, 133%
9. S/2+S/2, d/3, 6m/12, 67%
10. S/2+S/2 d/3, 12m/18, 89%
11. S/2+S/2 d/3, 8m/12, 89%
140
130
120
110
100
90
80
70
60
MARCH.
APRIL.
MAY.
JUNE.
JULY.
AUG.
SEPT.
OCT.
NOV.
DEC.
JAN.
FEB.

has been satisfactory for all systems of tapping under the conditions of the experiment, and the differences are not significant.

It will be noted from the figures for 1941 that bark renewal appears to be at a standstill in the fourth year. This is probably attributable to lack of the necessary precision in measuring very small increments from year to year, with the added difficulty that measurements cannot be made at exactly the same point in successive years. Measurements were made with the "Schlieper" bark gauge in 1940 and 1941, and a small correction was applied to bring the readings into line with those obtained with the gauge previously used. Consideration is being given to the advisability of judging renewal by annual measurements of the renewal during the first 12 months under different systems, as the experiment proceeds.

Brown Bast.—Table VII gives the total number of trees affected by Brown Bast at the end of each year of the experiment and the percentage of cases for the four-year period. There is a clear indication that the less intensive systems of tapping have resulted in a lower incidence of the disease, but the figure of 7.8% for the "Double Three" system is not considered unduly high.

TABLE I

MEAN YIELD IN KILOGRAMS OF TOTAL DRY RUBBER PER PLOT OF 30 TREES*

YEAR 1940/41

	Tapping System	Preliminary yields 1936/37 †	Experimental year 1940/41	Adjusted yields 1940/41	Scrap as % of Total
Sub-Block A Two Day Series	1. S/2, d/2, (2×6m/12), 100% ...	66.6	69.5	66.4	10.8
	2. S/2, d/2, (2×6m/12), 12m/18, 67% ...	60.9	53.3	56.9	10.8
	3. S/2, d/2, (2×2d/4), 100% ...	64.1	74.3	74.1	11.1
	4. S/4//S/4, d/2 (2×6m/12), 100% ...	63.9	75.1	75.2	8.5
	5. S/2+S/2, d/4, 100% ...	67.8	81.0	76.5	9.6
	6. S/2+S/2, d/4, 12m/18, 67% ...	62.3	55.2	57.1	9.3
Sub-Block B Three-Day Series	7. S/2, d/3, (2×6m/12), 67% ...	63.3	56.2	56.9	11.3
	8. S/2+S/2, d/3, 133% ...	65.5	83.5	81.6	10.9
	9. S/2+S/2, d/3, 6m/12, 67% ...	59.0	50.7	56.5	11.1
	10. S/2+S/2, d/3, 12m/18, 89,% ...	66.4	59.9	57.0	11.9
	11. S/2+S/2, d/3, 8m/12, 89% ...	63.6	65.6	66.1	10.3
	Mean ...	63.9	65.8	65.8	
	Standard error ...	...	...	3.6	
	Significant diff. (.05) *within* sub-blocks ...	...	...	10.0	
	do *between* sub-blocks ...	...	...	11.7	

* Approximate conversion to lbs. per acre × 7

† Ten months' tapping only.

TABLE II

ADJUSTED YIELDS AS PERCENTAGE OF SYSTEM NO. I

	Tapping System	1937/38	1938/39	1939/40	1940/41	1937/41
Sub-Block A Two-Day Series	1. S/2, d/2, (2×6m/12), 100% ...	100.0	100.0	100.0	100.0	100.0
	2. S/2, d/2, (2×6m/12), 12m/18, 67% ...	70.8	74.0	86.6	85.7	77.9
	3. S/2, d/2, (2×2d/4) 100% ...	110.4	108.6	109.3	111.6	109.5
	4. S/4//S/4, d/2, (2×6m/12), 100% ...	85.0	94.5	102.8	113.2	97.6
	5. S/2+S/2, d/4, 100% ...	96.8	105.7	107.4	115.2	105.9
	6. S/2+S/2, d/4, 12m/18, 67% ...	73.2	74.2	86.5	86.0	78.8
Sub-Block B Three-Day Series	7. S/2, d/3, (2×6m/12), 67% ...	67.8	71.2	79.5	85.7	74.9
	8. S/2+S/2, d/3, 133% ...	112.3	111.6	123.4	122.9	116.9
	9. S/2+S/2, d/3, 6m/12, 67% ...	69.0	73.6	82.1	85.1	76.0
	10. S/2+S/2, d/3, 12m/18, 89% ...	75.8	77.6	94.7	85.8	82.8
	11. S/2+S/2, d/3, 8m/12, 89% ...	81.0	89.0	101.0	99.5	91.6
	Mean ...	85.6	89.1	97.6	99.1	91.9
	Standard error ...	3.4	3.8	5.1	5.4	3.9
	Significant diff. (.05) *within* sub-blocks ...	9.5	10.6	14.4	15.1	10.7
	do *between* sub-blocks ...	10.5	10.5	17.4	17.6	11.0

TABLE III

MEAN MONTHLY YIELDS IN KILOGRAMS OF DRY RUBBER PER PLOT OF 30 TREES*

1937—41

Months	Tapping System																			
	1		2		3		4		5		6		7		8		9		10		11	
	Yield	%	Yield	As % No. 1	Yield	As % No. 1	Yield	As % No. 1	Yield	As % No. 1	Yield	As % No. 1	Yield	As % No. 1	Yield	As % No. 1	Yield	As % No. 1	Yield	As % No. 1	Yield	As % No. 1
March	2.81	100	2.30	81.8	3.15	112.1	2.61	92.9	2.80	99.6	2.52	89.7	1.85	65.8	3.63	129·2	2.24	79.7	2.79	99.3	2.99	106.4
April	6.31	100	5.52	87.5	7.02	111 2	5.98	94.8	6.52	103·3	5.31	84.2	4.04	64.0	7.40	117.3	4.45	70.5	5.74	91.0	6.11	96.8
May	4.15	100	3.51	84.6	4.69	113.0	4 21	101.4	4·95	119·3	3.35	80.7	2.95	71.1	5.42	130.6	2.98	71.8	3.97	95.7	4.31	103.8
June	5.59	100	4.42	79.1	6.26	112.0	5.62	100.5	6·56	117.4	4.33	77·4	3.97	71.0	7.11	127.2	3.74	66.9	5·08	90.9	5.65	101.1
July	5.93	100	4.82	81 3	7.12	120.0	6.20	104.5	7.84	132.2	4.83	81.4	4.51	76.1	7.92	133.6	4.12	69.5	5.69	96.0	5.50	92.7
August	6.32	100	4.83	76.4	7.80	123.4	6.33	100.1	7.54	119.3	5.41	85·6	4, .4	75.0	8.54	135.1	4.25	67.2	6.00	94.9	6.51	103.0
September	6.66	100	4.39	65.9	7,08	106.3	6.15	92.3	7.27	109.2	4.35	65.3	4.54	68.2	7.77	117.0	4.26	64.0	5.33	80.0	5.80	87.1
October	8.16	100	5.11	62.6	7.46	91.4	7.33	89.8	7.98	97.8	4.92	60.3	5.42	66.4	7.88	96.6	5.08	62.2	5.94	72.8	5.61	68.8
November	8.40	100	5.42	64.5	8.09	96.3	7.65	91.1	8.12	96.7	5.75	68.4	6.18	73.6	8.56	101.9	5.48	65.2	6.26	74.5	6.59	78.4
December	11.32	100	7.17	63.3	11.55	102.0	10.20	90.1	11·52	101.8	8·05	71.1	8.53	75.3	12.04	106.4	7.31	64.6	8.64	76.3	9·32	82.3
January	9.15	100	5.80	63.4	9.26	101.2	8.28	90.5	9.40	102.7	6.54	71.5	6.85	74.9	9.92	108.4	5.92	64.7	7.01	76.6	7.55	82.5
February	2.60	100	1.62	62.3	2.46	94.6	2.24	86.2	2.43	93.5	1.77	68.1	1.78	68.5	2.57	98.8	1·66	63.8	1.88	72.3	1.93	74.2
Total	77.40	100	54.91	70.9	81.94	105.9	72.80	94.1	82·93	107.1	57.13	73.8	55.36	71.5	88.78	114.7	51.49	66.5	64.33	83 1	67.87	87.7

*Approximate conversion of yields to lbs. per acre × 7.

TABLE IV

MEAN DRY RUBBER CONTENT PER CENT.

Months	Tapping Systems										
	1	2	3	4	5	6	7	8	9	10	11
March, 1940 ...	43.0	43.3	42.5	43.9	43.6	43.4	43.1	43.2	43.5	43.6	42.3
April ...	40.7	40.1	39.9	41.1	41.4	40.3	41.4	41.5	39.1	39.8	39.0
May ..	39.9	39.1	39.1	39.8	39.8	38.7	41.4	40.2	37.6	39.1	37.9
June	40.7	40.2	40.7	41.2	41.0	40.5	42.7	41.9	39.1	39.8	38.6
July ...	40.9	40.1	40.5	40.2	40.2	40.0	41.7	40.6	38.5	39.2	40.4
August ...	41.4	41.1	40.8	40.7	41.0	41.1	41.6	40.2	40.8	39.9	39.2
September ...	41.5	42.3	40.8	41.5	40.8	43.1	42.8	41.1	44.4	42.4	39.6
October ...	40.9	41.0	41.4	41.0	41.9	42.4	42.7	42.3	42.7	42.6	42.2
November ...	40.1	39.3	40.6	39.7	41.0	41.1	41.2	40.6	39.5	40.2	40.7
December ...	39.5	38.8	39.7	39.0	40.6	40.2	40.5	39.7	38.0	39.2	38.7
January ...	40.8	39.8	41.0	40.7	41.9	41.9	42.2	41.9	39.2	40.8	40.2
February, 1941 ...	42.1	40.8	41.9	41.8	43.0	43.0	42.4	42.3	40.6	41.7	40.7

TABLE V

DRY RUBBER CONTENT PER CENT

Tapping System	1937/38	1938/39	1939/40	1940/41
1. S/2, d/2, (2×6m/12), 100%	40.8	41.5	41.2	41.0
2. S/2, d/2. (2×6m/12), 12m/18, 67%	40.5	41.4	40.8	40.5
3. S/2, d/2, (2×2d/4), 100%	39.5	40.3	40.3	40.7
4. S/4//S/4, d/2, (2×6m/12), 100%	40.8	42.2	41.6	40.9
5. S2+S/2, d/4, 100%	40.8	41.6	41.9	41.4
6. S2+S/2, d/4, 12m/18, 67%	40.9	41.3	41.3	41.3
7. S/2, d/3, (2×6m/12), 67%	42.3	43.0	42.2	42.0
8. S/2+S/2, d/3, 133%	40.6	41.0	41.1	41.3
9. S/2+S/2, d/3, 6m/12, 67%	38.9	40.3	40.5	40.3
10. S/2+S/2. d/3, 12m/18, 89%	40.1	40.8	40.5	40.7
11. S/2+S2, d/3, 8m/12, 89%	39.0	40.0	40.4	40.0
Mean	40.4	41.2	41.1	40.9
Error	0.51	0.46		
Significant diff. (.05) *within* blocks ...	1.4	1.3	Not significant	Not significant
do *between* blocks	1.4	1.4	do	do

TABLE VI

THICKNESS OF RENEWING BARK IN MILLIMETRES

Tapping System	1938 13 months	1939 25 months	1940 37 months	1941 49 months	Increase 1938—41
1. S/2, d/2, (2×6m/12), 100%	5.8	6.6	6.7	6.9	1.1
2. S/2, d/2, (2×6m/12), 12m/18. 67% ...	5.8	6.9	7.1	6.9	1.1
3. S/2, d/2, (2×2d/4), 100%	5.9	6.8	7.0	6.9	1.0
4. S/4//S/4, d/2, (2×6m/12), 100% ...	5.9	6.6	7·0	7.0	1.1
5. S/2+S/2, d/4, 100%	6.0	6.7	7.3	7.2	1.2
6. S/2+S/2, d/4, 12m/18, 67%	5.9	6.9	7.6	7.3	1.4
7. S/2, d/3, (2×6m/12), 67%	5.9	6.6	7.4	7.1	1.2
8. S2+S/2, d/3, 133%	5.8	6.8	7.3	7.3	1.5
9. S/2+S/2, d/3, 6m/12, 67%	5.9	6.8	7.2	7.2	1.3
10. S/2+S/2, d/3. 12m/18, 89%	5.9	6.9	7.2	7.2	1.3
11. S/2+S/2, d/3, 8m/12, 89%	6.0	6.6	7.1	7.0	1.0
Mean	5.9	6.7	7.2	7.1	1.2

Differences not significant

TABLE VII

NUMBER OF TREES WITH BROWN BAST

Tapping System	No. of Trees				
	June, 1938	June, 1939	June, 1940	June, 1941	As a % of Total
1. S/2, d/2, (2×6m/12), 100%	6	6	4	6	3.3
2. S/2, d/2, (2×6m/12), 12m/18, 67% ...	0	2	3	3	1.7
3. S/2, d/2, (2×2d/4), 100%	3	5	8	8	4.4
4. S/4//S/4, d/2, (2×6m/12), 100%	2	4	7	7	3.9
5. S/2+S/2, d/4. 100%	3	9	11	12	6.7
6. S/2+S/2, d/4, 12m/18, 67%	0	4	1	3	1.7
7. S/2, d/3, (2×6m/12), 67%	3	3	4	3	1.7
8. S/2+S/2, d/3, 133%	8	11	12	14	7.8
9. S/2+S/2. d/3, 6m/12, 67%	4	6	3	3	1.7
10. S/2+S/2, d/3, 12m/18, 89%	4	5	5	5	2.8
11. S/2+S/2, d/3, 8m/12. 89%	3	5	7	7	3.9
TOTAL...	36	56	65	71	

THE PERFORMANCE OF IMPORTED CLONES IN CEYLON—V.

C. E. FORD, *Geneticist*

Introduction

IN the last report on this subject (R.R.S. *Quarterly Circular* 1940, Part 3), *all* the yield records of imported clones in this country which hitherto had been received by the Research Scheme were assembled in a series of four tables. As a consequence, the article was long and unwieldy. This report has been shortened by including only those data which fall into the following three classes :—

1. Yield per acre records of clones in commerical tapping.

2. Records from areas where a number of clones are in tapping under similar conditions of soil, climate, cultivation, tapping system, etc.

3. All available records of imported clones recommended by the Research Scheme for large or small scale planting and about which little is at present known regarding their yield capacity under Ceylon conditions.

These data are presented in Tables I, II, and III respectively.

Throughout the article tapping systems are represented symbolically according to the revised international notation. (For an explanation of this notation see R.R.S. *Quarterly Circular*, 1940, Part 3).

The information upon which this article is based has largely been supplied by various Ceylon estates, whose co-operation is once again gratefully acknowledged.

Commercial Tapping Records

Included in Table I with the yields of areas in commercial tapping are data taken from the records of large scale tapping experiments in which tapping is organised on commercial lines and the unit plot is a tapper's task. In these cases the results from the different tapping treatments are averaged and the actual harvested yields per acre are given, figures which are thus directly comparable with the remainder of the records in the table. The average intensity of tapping over the whole experiment is given under the column heading "Tapping System." (For example, TJ.1 on estate G is tapped on the three systems S/2, d/2, 100%; S/2, d/3, 67%; and S/3, d/2, 67%. The mean intensity of tapping is therefore $100+67+67\div 3=78\%$).

On the whole the yields shown in Table I may be considered very satisfactory. Several areas give promise of producing well over 1,000 pounds per acre at maturity and only two (the blocks of B.D. 5 and A.V.R.O.S. 50 on estate Y) are really bad. These two areas, however, are interplanted with Tea and in the case of B.D. 5 the yield figure is for nine months' tapping only.

The records from the areas of mixed clones in estates V and AG are extracted from the paper on "Budded Rubber in Commercial Tapping" contributed to the R.R.S. *Quarterly Circular*, 1941, Parts 1 and 2, by Messrs. Dias, Peiris & Co., to whom due acknowledgment is made.

All entries in Table I apply to the tapping years 1940 or 1940-41.

Notes on Table II

Table II has been compiled in order to make possible a rough comparison between the performance of clones growing under approximately the same conditions. Six of the ten areas are divided into small monoclone blocks; one (Estate V) is a uniform mixed polyclone planting; the remaining three are randomised block experiments on the Iriyagama Division of the Experiment Station, Peradeniya. Notes on the individual areas concerned are given below :—

Estate D, Kalutara District.—A 5 acres area of poor soil on the top of a small hill replanted with budded stumps in 1930. No manure given in early years. Tapping commenced April, 1937.

With the exception of TJ.16, all clones showed a further slight increase in yield in 1940-41. This increase, which ranges from 0.3 to 1.9 pounds per tree, may be considered satisfactory in view of the fact that the tapping system was changed from S/2, d/2, 100% to S/2, d/3, 67% in August, 1940. The decrease in yield (per tree) of TJ.16 may be attributed partly to brown bast and partly to the large increase in number of trees tapped (from 79 to 115), the new trees presumably being of smaller girth.

Estate P, Kurunegala District.—A five acres area of good jungle soil planted with budded stumps in September, 1940.

The figures from this area for the year 1940-41 are rather disappointing. Three clones, B.D. 10, A.V.R.O.S. 50, and A.V.R.O.S. 152, have given marked increases in yield; five have remained more or less stationary; and one, TJ. 16, has shown a decrease for the second successive year. This behaviour on the part of TJ. 16 is very disappointing and is difficult to account for.

Estate V, Kalutara District.—A detailed account of this area was given in the article on "Budded Rubber in Commercial Tapping" by Messrs. Dias, Peiris & Co. referred to above. The figures given in Table II were obtained by multiplying the mean yields per tapping given on page 35 of that article by the number of tapping days on which yields were recorded in the year 1940. The figures so obtained do not represent the full yields for the year as records were not kept on partial washout days.

Yields of four local clones are included in this table for comparison with the imported clones.

Estate W, Kelani Valley District.—29 acres of steep hillside cleared from virgin jungle, planted in 1928 and budded in 1930/31. Soil poor and badly washed. Growth is backward. Original stand approximately 200 trees per acre, reduced to 135 per acre in 1937. Tapping commenced on trees of 22 inches girth and over in March 1939 on 2S/2, d/4, 100%. In 1940 the tapped stand per acre was 59 trees. Yields of dry rubber estimated from metrolac readings. Scrap is included. There are 15 to 20 per cent. B.D. 2 trees in the B.D. 10 block.

Yields are about the same or slightly higher than in 1939-40, in spite of a large increase in number of trees tapped.

Estate X, Kelani Valley District.—The tapped area is a 45 acres clearing planted in 1928 and budded in 1931 at a density of 190 plants per acre. It was thinned slightly in 1938, more heavily in 1939, and again slightly in 1940, at the end of which year the total stand of trees was 115 per acre with 91 per acre in tapping. The area is very rocky but there would appear to be many pockets of good soil. Growth has been poor, no doubt largely due to the high original stand per acre and the late thinning-out of the trees. Tapping was commenced in October, 1938. Yields are estimated from metrolac readings. Scrap is included.

The yields of all clones in 1940 show very satisfactory increases over the figures for the tapping year 1938-39, though the general level of yield is still low. The order of the clones in Table III has changed considerably, probably due to the varying numbers of new trees brought into tapping.

Estate AB, Kurunegala District.—A 49 acres replanted area on gently undulating land budded in the field in 1932-33. Growth good. Tapping commenced in April, 1939 on S/2, d/3, 67%. Present stand very uneven but averages 102 trees per acre, of which 68 are in tapping. Yields are estimated from metrolac readings.

In spite of the large increase in number of trees tapped, all clones have shown a satisfactory yield increase in this, their second year of tapping.

Estate AD, Elpitiya District.—A ten-acre block of gently undulating land replanted with ten clones, each clone occupying one acre. Initial stand approximately 175 trees per acre but now about 120 per acre. Tapping commenced in January, 1940 on S/2, d/2, 100%. Only trees of 22 inches' girth and over were tapped. The latex from each clone is coagulated, rolled, and weighed separately. Scrap is included.

The yields per tree shown in Table II are good for the first year of tapping, though the very conservative criterion of tappability, 22 inches, should be remembered when comparing these yields with those from other areas. Since each of these clones occupies one acre, an estimate of yield per acre may be made by multiplying yield per tree by number of trees of each clone in tapping. B.D. 5 tops this list, with A.V.R.O.S. 49 and 50 second and third respectively.

Iriyagama Division, Experiment Station, Peradeniya.—All three areas were cleared from virgin jungle and are laid out as randomised block experiments in which the unit plot consists of 12 trees and occupies 0.12 acre. The original stand per acre was thus 100 trees. There has been no thinning (apart from natural losses due to wind damage, etc.). In all these areas early growth was slow. No manure was given until 1935.

Tapping was commenced (area 6) in July, 1937 on S/2, d/2, 100%, but was changed to S/2, d/3, 67% in January, 1938. Areas 7 and 8 were opened on S/2, d/3, 67% in July, 1938 and July, 1939 respectively.

Area 6 is the only one which remains of real interest. Here all clones have shown an excellent increase in yield over the figures for 1939, TJ. 1 for instance having improved from 5.9 to 8.1 pounds per tree. Since each clone occupies 0.6 acre, per acre yields may be estimated directly, that of TJ. 1 working out at 768 lbs. for the year.

The general level of yield in these areas, however, is low, and is probably to be associated with the high elevation (1,600 ft.) and the consequent slow growth. The yields of the buddings are seen in proper perspective when compared with the control (unselected) seedlings.

Notes on Individual Clones

The following comments and recommendations are largely based upon observations made and information received during the past year. Further notes on the clones of main interest will be found in earlier articles of the present series.

Tjirandji 1 Yield.—This is quite the most extensively planted clone in Ceylon at the present day and the first records from areas in commercial tapping have been awaited with interest. The yield figures assembled in Table I are very encouraging and go to confirm the high opinions formed of the yielding power of the clone based on the earlier test-tapping results. Average yields of areas in their first and second years of tapping calculated from the figures given in this table work out at 538 and 611 pounds per acre respectively.

Wind Damage.—Replies to a recently circulated questionnaire on the incidence of various types of wind damage in immature budded areas indicate that although this clone suffered more heavily than most, the damage inflicted is not of an order which would justify the rejection of the clone from a planting or replanting programme on the grounds of liability to wind damage alone. Nevertheless, it is advisable to plant Tjirandji 1 at a density not less than the standard recommended by the Research Scheme (140-150 per acre).

It is known that TJ. 1 has been extensively planted on the east coast of Sumatra, where violent wind storms are relatively frequent, and that it is a common practice there to thin out the crowns as a means of protection against wind damage. Claims have been made on behalf of such thinning in this country, but it is considered that evidence is not yet sufficient to justify its general adoption. (This, of course, does not affect the Research Scheme's standard recommendation to remove the "master" branch).

Brown Bast.—Evidence obtained during 1940-41 from the large scale tapping experiments on estates A and Y and from other areas make it unnecessary to alter last year's statement on this subject, namely " . . . . . the incidence of brown bast on the alternate day system is not high enough to justify the recommendation that the clone be tapped on a milder system (S/3, d/2, or S/2, d/3) right from the start, except perhaps, where the stand per acre is relatively low. Nevertheless, a careful watch on this disease should be kept so that a change-over to a milder system could be made if necessary."

Precoagulation.—Spontaneous coagulation in the cup has been reported from several estates. The trouble appears to be worst when cuts are first opened, or at the recommencement of tapping after the wintering period, but does not seem to be persistent.

Tjirandji 16.—The commercial yield figures of this clone are also very satisfactory, though it should be pointed out that the area on estate E gave a higher yield in 1939, its first year of tapping. The decline in yield of this area in 1940 is as difficult to account for as it was unexpected. It is too great to attribute to unfavourable weather conditions alone and the loss to the tapped stand through wind damage and brown bast has been negligible.

Although a similar decline in yield in 1940 was noted on two other estates, its good performance elsewhere (and in two smaller areas on estate E) encourages the hope that these are only temporary set-backs. The clone is still recommended with confidence for planting both in the wet and the dry zones. For the latter it still appears to be one of the most promising clones available.

Bodjong Datar 5.—No essentially new information regarding this clone has been obtained during the past year. With the exception of the area on estate Y, which, as explained above, is interplanted with tea, the yields given in Table I are satisfactory.

Bodjong Datar 10.—Examination of Tables I and II shows that, in general, yields are very satisfactory. Growth is vigorous and the objectionable secondary characters noted elsewhere (liability to wind damage, uneven bark renewal, brown bast) do not yet appear to be so serious in this country. The trees are handsome, with straight erect trunks, which, however, are often fluted at the base.

Prang Besar 25.—It will be seen from Table III that, with one exception, the yields of this clone are uniformly bad. The area at Dartonfield which was mentioned in last year's report was taken into tapping in March of this year. To date, the yield of P.B. 25 has been below that of A.V.R.O.S. 256 and barely more than half that of Glenshiel 1 planted in the same field.

On account of its continued poor performance, for the present further planting of this clone is not advised. Observations on the clone will be maintained, and as stated in a previous report, if more satisfactory yields are recorded in the future, it may be reinstated in our lists of approved material.

Prang Besar 86.—Reliable information regarding the yielding power of this clone in Ceylon is still awaited. The one record, from estate F (Table III), is satisfactory, but is based on 3 trees only. Growth on Ceylon estates appears to be very good, especially in the first two years. An open and rather light crown makes the clone suitable for planting in the wet districts where the rapidity with which the tapping panels will dry out is a matter of importance.

Prang Besar 186.—Experience of this clone in Ceylon is also limited. The yield figures available up to the present are not very high, but at Nivitigalakele in 1940 it was the highest producer

out of a collection of 20 unproved clones in a poor yielding field, while on estate F there are only 6 trees in tapping.

The clone has hard bark and is liable to develop protuberant buds which may even appear on the future tapping panel. The trees at Nivitigalakele and on estate F are so far free from this defect, which in other countries is reported to be local in its appearance. As it is a vigorous grower and has the reputation of producing a really high yield, it should prove a valuable addition to the collection of clones on those estates where experience in respect of the defect just mentioned is satisfactory.

Until further evidence is available P.B. 186 can only be approved for small scale use. Estates which have not yet done so are advised to consider the inclusion of a small test area in their replanting programmes. A report from Java indicates that it may be suited to the drier districts.

Glenshiel 1.—All the yield records of Glenshiel 1 hitherto received by the Research Scheme are satisfactory, the yields from estate AH and from the Dartonfield 7½ acres field (mentioned above under P.B. 25) being particularly promising.

In Malaya the clone is liable to develop dry areas on the tapping cuts when tapped on S/2, d/2, 100%. It will be noted that all but one of the yield figures given in Table III are from areas tapped on milder systems than S/2, d/2, 100%. The trees on estate AH and a part of the trees in the Dartonfield 7½ acres field are being tapped on this system, and so information regarding the clone's reaction to 100 per cent intensity tapping in this country should shortly be forthcoming.

Glenshiel I is recommended for use on a large scale. It should be particularly suitable for the wetter districts on account of its light crown, which should make for rapid drying of the tapping panels.

Pilmoor B.84.—So far as the writer is aware, the first trees of this clone to be planted in Ceylon were put out as budded stumps in the South West Monsoon 1938. Hence it will be necessary to wait a further three or four years before yield figures are available. Meanwhile, it is satisfactory to note that observations made on young buddings in this country bear out the Malayan reports of vigorous growth.

P.R. 107.—Forty trees of this clone are in test tapping on estate AE on the S/2, d/3, 67% system. Since October, 1940 the biscuits have been weighed monthly by the Research Scheme. The yield figure of 7.2 pounds given in Table III is an estimate for a full year derived from the average yield per tapping over the period October, 1940 to August, 1941. It may be considered very satisfactory, but not outstanding.

The trees were planted as budded stumps in 1931. They are well grown and appear to have good bark renewal.

Reports on the growth of younger material in Ceylon are variable. This is in keeping with recent information from Java, where the clone is known to grow vigorously in some localities but more slowly in others. It is interesting to note that in a trial at a high elevation (ca. 1,500 ft.) in that country, P.R. 107 was the second most vigorous grower and the highest yielder out of 39 clones.

Waringiana 4.—Reports from estates and measurements made at Nivitigalakele indicate that the early growth of this clone is outstanding. In Java, Waringiana 4 is considered to be suitable for use in districts "with a dry East Monsoon." The clone may therefore prove to be well adapted to the drier districts in this country.

A.V.R.O.S. 255 and 352.—These two clones have grown well in the 1940 clone trial at Nivitigalakele and on the one estate where they have been seen by the writer.

Present Recommendations

Recommended for Large Scale Planting :—

(Up to a maximum of 25% of the total planting programme for any one clone).

TJ. 16	P.B. 86
Glenshiel 1	Pilmoor B. 84
TJ. 1*	Millakande 3/2*
B.D. 5*	Wagga 6278*

* With reservations ; see text overleaf.

Recommended for Small Scale Planting :—

(Not more than 10% of the whole planting programme for any one clone or seedling family, nor more than 20% for all material of this class).

P.B. 186
HC. 28
A.V.R.O.S. 255
A.V.R.O.S. 352
P.R. 107
WAR. 4
Pilmoor D. 65

Seedlings for Use as Stocks :—

A.V.R.O.S. 163 illegitimate
TJ. 1 illegitimate
B.D. 10 illegitimate.

Failing these, well mixed seed from polyclone blocks or from the adjacent boundaries of monoclone blocks.

(Recommendations regarding clonal seedling material are under revision and it is hoped shortly to publish an advisory circular on the subject).

Since the last publication of these recommendations (R.R.S. *Quarterly Circular*, 1940, Part 3), two changes have been made. Wagga 6278 is now approved for large scale use and P.B. 25 has been removed from the lists altogether.

Four of the clones included in the "large scale" list are recommended with reservations as to district or soil type : TJ. 1 is not advised for use in the drier districts on account of its marked tendency to decline in yield in dry weather ; B.D. 5 should only be planted on deep fertile soils or where previous experience is satisfactory ; and the two local clones, MK. 3/2 and WG. 6278, are only advised for large scale use under conditions of soil and rainfall similar to those at Nivitigalakele.

Although Pilmoor B. 84 is approved for planting on a large scale, the case of P.B. 25 suggests that it would be advisable to limit planting (of Pil. B. 84) to an area less than the maximum indicated for this scale until records of its yield in this country are available. The same remarks apply, though with not quite the same force, to P.B. 86. In the case of this clone however, another year should see a marked increase in our knowledge of

its performance under Ceylon conditions. It should clearly be stated that nothing detrimental is known regarding either of these two clones. The advice tendered above is determined solely by insufficient evidence of their performance in this country.

Most of the clones included in the "small scale" list have only recently been introduced into Ceylon. Though certain of them are of outstanding performance in their countries of origin, until evidence has been accumulated regarding their reaction to local conditions they cannot be approved for extensive use in Ceylon.

It is becoming increasingly clear, both from observations made in Ceylon and from publications received from Malaya and the Netherlands East Indies, that clones vary in their requirements for optimum performance. In other words, clones which do well in one situation are not necessarily equally well suited to another. For this reason estates are encouraged to include in their planting programmes small test areas of a number of the approved clones of which they have no experience. For instance, a selection of five clones new to the estate might be given one acre each in a five-acre block. The information derived from such areas would be of the utmost value when selecting material for use in later programmes.

TABLE I

YIELDS FROM AREAS IN COMMERCIAL TAPPING

Tapping Year 1940 or 1940-41.

Clone	Estate and District	Age in years	Area in acres	Year of tapping	No. of tappings per tree	Tapped stand per acre	Yield in lbs. per acre for year	Tapping System
TJ. 1	AA. Kalutara	6	32	1	69	68	427	2S/2, d/4, 100%
TJ. 1	AA. Kalutara	8	32	1	69	108	524	2S/2, d/4, 100%
TJ. 1	A. Kalutara	8½	16	2	142[1]	125	764[1]	87%[1]
TJ. 1	A. Kalutara	8½	14.5	1		121	537	S/2, d/3, 67%
TJ. 1	AF. Ratnapura	9	20	1	64	105	421[2]	S/2, d/2, 100%
TJ. 1	Y. Ratnapura	9	18	2	141[1]	111	500[1]	87%[1]
TJ. 1	AA. Kalutara	9	9	1	75	101	783	2S/2, d/4, 100%
TJ. 1	AA. Kalutara	9	9	1	70	115	736	2S/2, d/4, 100%
TJ. 1	G. Galle	9	5.3	2	140[1]	*ca.* 120	527[1]	78%[1]
TJ. 16	H. Ratnapura	8½	21	2	154[1]	110	692[1]	100%[1]
TJ. 16	A. Kalutara	8½	4.5	1		113	563	S/2, d/2, 100%
TJ. 16	E. Kurunegala	8½	3	2	167	*ca.* 140	888	S/2, d/2, 100%
B.D. 5	AA. Kalutara	8	42	1	73	98	470	2S/2, d/4, 100%
B.D. 5	A. Kalutara	8½	20.5	2	141[1]	105	627[1]	100%[1]
B.D. 5	Y. Ratnapura	8½	14	1	106	56	179[3,4]	S/2, d/2, 100%
B.D. 5	G. Galle	9	3.6	2	141[1]	*ca.* 100	542[1]	78%[1]
B.D. 5 & B.D. 10	A. Kalutara	8½	5	1		95	526	S/2, d/2, 100%
B.D. 10	A. Kalutara	8½	3.5	1		137	790	S/2. d/2. 100%
A.V.R.O.S. 49	E. Kurunegala	8	5.2	2	167	*ca.* 120	608	S/2 d/2, 100%
A.V.R.O.S. 49	A. Kalutara	8½	14	1		144	740	S/2, d/2, 100%
A.V.R.O.S. 49	G. Galle	9	5.8	2	141[1]	*ca.* 130	480[1]	78%[1]
A.V.R.O.S. 50	Y. Ratnapura	8	40	1	134	74	278[4]	S/2, d/2, 100%
A.V.R.O.S. 50	A. Kurunegala	8½	19	1		144	520	S/2, d/2, 100%
Mixed[5]	V. Kalutara	7	18	2	98	*ca.* 130	519	S/2, d/3 67%
Mixed[5]	AG. Kalutara	7½	23.5	2	102	*ca.* 115	569	S/2, d/3, 67%
Mixed[6]	V. Kalutara	8	5	2	145	*ca.* 140	773	S/2, d/2, 100%

1 Large scale tapping experiment.—Number of tappings as for S/2, d/2, 100% system.—Average intensity of tapping given.
2 Five months' tapping only.
3 Nine months' tapping only.
4 Interplanted with tea.
5 Mainly TJ. 1 and G. 1
6 TJ. 1, TJ. 16, G. 1, B. D. 5, W. 259, W 320, M. 191
7 G. 1, tapped on S/3, d/2, 67%

TABLE II

YIELDS FROM AREAS WHERE A NUMBER OF CLONES ARE IN TAPPING UNDER SIMILAR CONDITIONS

Tapping on S/2, d/2, 100% except where otherwise stated.

Estate	D	P	V
District	Kalutara	Kurunegala	Kalutara
Annual rainfall in inches	146	90	150
When budded or planted	1930 Budded stumps	1930 Budded stumps	June, 1933. Budded stumps
Period of tapping	March, 1940—February, 1941	March, 1940—February, 1941	1940
Yield in lbs. per tree for period stated. Number of trees tapped in brackets	(30) B.D. 5 7.1 (61) A.V.R.O.S. 50 6.4 (44) B.D. 10 6.3 (115) TJ. 16 5.7 (56) A.V.R.O.S. 49 5.2 (109) TJ. 1 4.3 *Tapped on S2/, d/3. 67% from August 1940*	(48-44) B.D. 0 10.1 (39-35) A.V.R.O.S. 152 9.1 (22-21) TJ. 16 8.7 (45) A.V.R.O.S. 50 8.7 (47-44) B.D. 5 8.0 (22-18) TJ. 8 7.9 (47-45) CT. 88 7.8 (43) A.V.R.O.S. 49 7.0 (34-32) B.D. 2 6.8	(40) *HC. 28* **4.3** (40) TJ. 1 **4.2** (40) G. 1 **3.8** (20) *W. 259* **3.4** (20) *W. 120* **2.6** (20) *W. 320* **2.6** (20) R. 393 **1.7** *Tapped S/2, d/3, 67%* *Local clones in italics*

TABLE II.—(*contd.*)

Estate	W		X	
District	Kelani Valley		Kelani Valley	
Annual rainfall in inches	*ca.* 200		180	
When budded or planted	1931/32. Budded in field		1931. Budded in field	
Period of tapping	March, 1940—February, 1941		1940	
Yield in lbs. per tree for period stated. Number of trees tapped in brackets.	(176) B.D. 10	5.8*	(262) P.B. 23	7.1
	(179) DJ. 1	4.7	(315) TJ. 16	6.6
	(225) TJ. 1	4.6	(1948) B.D. 10	6.3
	(304) B.D. 5	4.6	(1965) T.J. 1	6.1
	(89) A.V.R.O.S. 50	4.3	(1311) B.D. 5	5.9
	(147) B.D. 2	4.1	(425) A.V.R.O.S. 163	5.0
	(190) TJ. 16	4.0	(348) A.V.R.O.S. 152	4.9
	(132) A.V.R.O.S. 256	3.3	(13) DJ. 1	4.6
	(166) A.V.R.O.S. 49	2.9	(562) A.V.R.O.S. 49	4.3
			(51) S.R. 9	4.1
	Tapped 2S/2, d/4, 100%		(63) P.B. 123	3.9
	* *15—20% B.D. 2*		(724) P.B. 25	3.8
			(639) A.V.R.O.S. 50	2.9

TABLE II.—(*contd.*)

Estate	AB		AD	
District	Kurunegala		Galle	
Annual rainfall in inches	100		135	
When budded or planted	1932-1933. Budded in field		1931. Budded in field	
Period of tapping	March 1940—February, 1941		1940	
Field in lbs. per tree for period stated. Number of trees tapped in brackets	(163) G. 1	3.0	(59) TJ. 16	6.9
	(402) TJ. 16	5.7	(35) DJ. 1	6.7
	(34) A.V.R.O.S. 163	5.4	(69) B.D. 5	6.5
	(833) B.D. 5	5.3	(18) P.B. 23	6.3
	(158) TJ. 1	5.2	(54) TJ. 8	6.3
	(241) B.D. 2	5.1	(62) B.D. 10	6.2
	(421) B.D. 10	4.6	(76) A.V.R.O.S. 49	5.7
	(486) A.V.R.O.S. 50	4.4	(79) A.V.R.O.S. 50	5.2
	(289) A.V.R.O.S. 49	4.2	(86) P.B. 25	4.7
			(78) A.V.R.O.S. 256	3.4
	Tapped S/2, d/3, 67%			

TABLE II.—(*contd.*)

Estate	Iriyagama Division Area 6	Iriyagama Division Area 7	Iriyagama Division Area 8
District	Kandy	Kandy	Kandy
Annual rainfall in inches	93	93	93
When budded or planted	October, 1929 Budded stumps	November-December, 1931 Budded stumps	October-November, 1930 Budded stumps
Period of tapping	1940	1940	1940
Yield in lbs. per tree for period stated. Number of trees tapped in brackets.	(57) TJ. 1 8.1 (55-51) TJ. 8 6.9 (57-5) TJ. 16 6.7 (50-49) *H2.* 4.9 (54) A.V.R.O.S. 50 4.4 (48-47) S.R. 9 4.0 (59) A.V.R.O.S. 49 3.9 (52) B.D. 5 3.6 (59) *Seedlings* 3.1 *Tapped S/2, d/3, 67%*	(58) P.B. 23 4.6 (57) A.V.R.O.S. 256 3.7 (38) P. & T. 11 3.0 (47) *H2.* 2.9 (57) *Seedlings* 2.4 (42) C.T. 88 1.5* *Tapped S/2, d/3, 67%* **Tapped from July, 1940 only.*	(50) BR. 2 5.2 (48) B.R. 1 5.0 (51) A.V.R.O.S. 71 3.7 (47) *H2.* 2.2 *Tapped S/2, d/3, 67%*

TABLE III

YIELDS OF SELECTED CLONES ON CEYLON ESTATES, GROUPED BY CLONES

Tapping on S/2, d/2, 100% unless otherwise stated.

Estate	District	No. of trees	Yield in lbs. per tree per annum at ages of (to the nearest half-year)											
			5	5½	6	6½	7	7½	8	8½	9	9½	10	10½
							Glenshiel 1							
V	Kalutara	40					3.8*							
V	Kalutara	110					4.7‡							
AB	Kurunegala	73-166				6.6*		8.0*						
AE	Kalutara	40										6.1*		
AH	Kalutara	77				5.5†								
							Prang Besar 25							
Nivitigalakele	Kalutara	10-8			1.4		3.9		5.9		5.6		7.2	
F	Kegalle	2									3.9			
I	Kalutara	49					3.1		4.3					
Q	Kalutara	3	5.1		6.8		8.2							
X	Kelani Valley	418-724						2.3		3.8				
AD	Galle	86								4.7				
							Prang Besar 86							
F	Kegalle	3					8.6		9.4		9.5			
							Prang Besar 186							
Nivitigalakele	Kalutara	21-23						4.0		5.0				
F	Kegalle	6									4.3			
							P. R. 107							
AE	Kalutara	40										7.2*		

*Tapped on S/2, d/3, 67% ‡ Tapped S/3, d/2, 67% † Yield estimated from records of the first 4 months' tapping.

SOME WARTIME PROBLEMS OF THE RUBBER INDUSTRY*

T. E. H. O'BRIEN, *Director.*

THE task of the local Rubber industry in the war is to "stay on the job" and maintain supplies of an essential war commodity. The fulfilment of this task involves the solution of various incidental problems, and I propose to discuss a few of them briefly this morning.

Crop

The problem which is most to the fore at the moment is that of producing maximum crop, to meet the increase in the export quota to 120 per cent for the last quarter, or 105 per cent for the full year. Recently the Rubber Controller issued a circular to Estate Proprietors pressing for the production of the full exportable maximum, and hinting that legal steps might have to be taken if Producers do not "work their estates." There has been some apprehension that estates might be called on to over-tap but I do not think this apprehension is justified. Nothing has been said about "over-working" estates, and I happen to know that a notice which will shortly be issued by the Rubber Control Department refers to the production of the maximum crop which can be obtained "without over-tapping or damaging the trees." It is difficult to give a definition of over-tapping which is equally applicable to all areas, but I should be surprised if pressure was exerted on estates to adopt tapping systems in excess of 100 per cent intensity, *e.g.*, the half-spiral alternate-daily system (S/2, d/2, 100%). On the other hand the least that Producers can do is to tap at full 100 per cent intensity, if they wish their assessments to remain at the present level. If

* An address given to the Southern Province Planters' Association on September 13th, 1941.

it is claimed that an estate will only stand a milder system, then the assessment, which is normally based on 100 per cent intensity, is too high and should be reduced.

The production of extra crop by over-tapping might seriously prejudice the future of the local industry, and would, in my opinion, only be justifiable in extreme emergency. Although maximum output is required there is no present indication that the few thousand extra tons which Ceylon might be able to produce by over-tapping would have an important influence on the general war effort.

There are, however, many local estates on which the trees have good bark reserves, and could be tapped at a greater intensity than 100 per cent for a limited period without serious risk. In such cases it is both patriotic and profitable to take advantage of the present favourable export quota and market position. We are fortunately able to give useful advice on the subject, on the basis of a tapping experiment which has been in progress at Dartonfield for the past 4 years. One of the systems under trial is the "double-three" without rest (2S/2, d/3, 133%), which was included in the trial in view of its possible utility for adoption in areas due to be replanted within a few years. Rather surprisingly the yield has remained at a satisfactory level, the average for four years being 17 per cent above that of the half-spiral alternate-daily system. Another important point is that the dry rubber content of the latex has not fallen, as might be expected if the system was placing an undue strain on the trees. Bark consumption has been at the rate of about 8½ inches per annum, and renewal is slightly better than that of the trees tapped on the half-spiral alternate-daily system. Brown bast has shown an increase over the standard system, but the number of cases is not excessive, the figures for the four-year period being 7.8 per cent and 3.3 per cent respectively. These results have been obtained on an estate, in the wet zone, with good bark reserves, and the system can be commended for adoption under similar circumstances to meet the demand for increased crop for a limited period. It must, however, be recognised, that it may prove necessary, at a later date, to rest the trees for a period corresponding to the extra intensity of tapping. The number of tappers required for the "double-three" system is approximately the same as for alternate day tapping.

Another system which has consistently given a somewhat increased yield is a modification of the half-spiral alternate-daily system, in which the two sides of the tree are tapped alternately. Thus the tree is tapped every two days but there is a four-day interval between the tappings of each cut. The system is designated S/2, d/2, (2 × 2d/4), 100%. Average yield over the four-year period is 9 per cent higher than that of the half-spiral alternate-daily system; the increase is not "statistically significant" (*i.e.*, may be due to chance) but it may well be a real one and it might, in fact, be anticipated that the system would give a small increase in yield at the expense of somewhat increased bark consumption. Cases of brown bast for the period amount to 4.4 per cent. This system may prove useful on estates where it is not considered advisable to increase tapping intensity beyond 100 per cent. The average yield of the double-four system is 6 per cent above that of the half-spiral alternate-daily system; this increase, again, is not statistically significant.

An interesting feature of the systems which give a higher yield than the half-spiral alternate-daily system is that the extra crop appears to be mainly secured in the first half of the year; during the flush months towards the end of the year the yield of the half-spiral alternate-daily system shows a more pronounced upward trend than that of the other systems, and approaches the same level. The logical inference from these observations would be that the adoption of modified systems would not substantially increase crop during the next few months. Nevertheless undue weight should not be given to the results from a single estate. The level of yield probably depends very largely on climatic factors and substantially different results might well be obtained under slightly different conditions.*

Replanting

Apart from the importance of harvesting maximum crops under present circumstances it would appear to be a poor business proposition to cut out tappable Rubber for replanting at a time when the market is so favourable. There has, however, been a fair amount of replanting this season and I have heard of more than one estate on which replanting is proposed in 1942. The usual explanation is, of course, the desirability of maintaining continuity in replanting programmes. Ceylon certainly has much leeway to make up in the planting of improved material but, in

* See page 61.

my opinion, it would be more profitable policy, as well as being more helpful to the war effort, to retain the areas in tapping while prices are favourable, and to build up a reserve for accelerated replanting when the demand for the commodity falls off.

In the meantime the preparation of planting material could be undertaken with a view to making up lost time as far as possible when replanting is resumed. An experiment was laid down at Dartonfield in 1936 to compare 3 forms of planting material namely (i) dormant budded stumps (ii) stumped buddings (iii) seed at stake subsequently budded in the field. Mean girths of the plants after 5 years were as follows :—

Budded stumps	...	16½ inches.
Stumped buddings	...	19 „
Field buddings	...	11½ „

71 per cent of the stumped buddings and 25 per cent of the budded stumps had attained a girth of 18 inches.

These results suggest that valuable time can be saved by using stumped buddings as planting material, and it is useful to consider whether the method can suitably be adopted for large scale commercial planting. Our own experience with stumped buddings has been very satisfactory. In the 1936 trial 400 stumps were planted out without a casualty, and the method had previously been used with success for late supplying of vacancies in test plots. Results on estates have, I think, been rather mixed but in some instances at least the difficulties can be attributed to lack of experience. One mistake has been to plant out the stumps before they are sufficiently mature. We favour the use of well grown stumps, budded at the age of about 18 months and planted out 2 years later, when the average girth will be about 6 inches, and the snags have had time to heal over. Early growth of the transplanted stumps is dependent on the food reserves present in the tissues, and it is, therefore, desirable that the plants should be maintained in a vigorous condition in the nursery by periodical manuring. Careful transplanting is particularly important with stumped buddings. In lifting the plants, side roots cannot usually be kept intact but they should not be cut within 12 inches of the tap root. In planting, the earth should be replaced in the hole in layers of six or eight inches, and packed tightly with the feet round the tap root and side roots. This precaution, which is also

important with budded stumps, will save many casualties if dry weather occurs shortly after planting. It seems clear that clones vary in their suitability for planting as stumped buddings, clone Tjirandji 1, in particular, tending to die back rapidly from the top if conditions are at all unfavourable. It remains to be seen whether this tendency can be reduced by sealing the top of the stump with wax or a mixture of cowdung and clay, or by stumping the plants in the nursery a few weeks prior to planting in order to stimulate sprouting of the buds.

During the hot dry weather in the early months of this year there were several complaints of sun-scorch of stumped buddings. In some cases the scorch took the form of a long strip down one side of the stump, in others, particularly where the snag was not fully healed, an inverted V strip above the snag was affected. It is believed that most of the cases occurred on stumps planted during the N. E. monsoon, and the risk of scorch is obviously to be expected if hot dry weather occurs before the new roots and leaf shoots are sufficiently developed to draw an adequate supply of moisture from the soil. The stumps can be protected from sun-scorch by wrapping the stems with creepers during dry weather, and it may be practicable to achieve a similar result by applying white-wash.

My conclusion is that stumped buddings are a suitable form of planting material for use in the main Rubber planting districts, and that delay arising from the postponement of replanting programmes can be minimised by laying down stumped budding nurseries for use when operations are resumed. Similarly for those who wish to plant clonal seed, the material can be planted out in nurseries for later use. In 1931 and 1932 we laid down nurseries of Tjikadoe and Prang Besar seed with the intention of transplanting in the following year. As it happened, land was not available until 1935 and the material was planted out as stumps of 10-15 inch girth. Casualties were very few and a number of the trees were brought into tapping within 4 years.

Stumped buddings cannot be recommended for planting in dry areas. Two years ago we planted 12 stumps, as a trial, at the Coconut Research Scheme's estate at Ratmalagara, in the Chilaw district. Although 8 of them have survived, sun-scorch

was severe and most of the stumps died back to within a few feet of the union before becoming established. This year twelve budded stumps were planted out in the same area and all were growing well when I saw them early last month.

Fertilisers

You are probably all aware of the shortage of various fertilisers arising from the war. Supplies of sulphate of ammonia and calcium cyanamide were cut off at an early stage, and nitrate of soda, while still being imported in limited quantities, has reached a price level which makes its use uneconomic for Rubber manuring, except as a minor ingredient. Fortunately we have a near-by source of nitrogen in the form of groundnut cake from South India, and supplies of this material appear to be adequate in quantity and reasonable in price, for the present. Limited quantities of blood meal and animal meal are also available. We have insufficient knowledge of the comparative value of different forms of nitrogenous fertilisers to have a definite preference for one of them, and our advice for some years has been to use the cheapest form available, on the basis of cost per unit of nitrogen. It is mainly for this reason that inorganics were favoured before the outbreak of war. One drawback to the use of organic forms of nitrogen is that they must be forked into the soil, whereas soluble inorganic fertilisers can safely be broadcast under normal conditions.

Superphosphate is not now available, but supplies of rock phosphate are still plentiful, and bone meal can also be obtained. Rock phosphate is considered very suitable for use in the acid soils comprising the main Rubber growing districts. Supplies of muriate of potash are scarce and it is understood that no further imports are likely. Fortunately potash does not appear to be an important factor in Rubber manuring under average local conditions.

With regard to the manuring of mature Rubber our general view is that periodical fertiliser applications are essential on most estates if deterioration of foliage and bark renewal are to be avoided. The results of an experiment which has been in progress at Dartonfield for several years suggest that only in the case of nitrogen has manuring proved economic on the basis of increased crop, but we continue to advise small periodical applications of phosphoric acid and potash in addition, as an insurance against

serious deficiencies of these constituents. Our standard programme for mature areas provides for a biennial application using, alternately, nitrogen only, and a "complete" mixture containing N., P., and K at the rate of 60, 20, and 12½ lbs. per acre respectively. The cessation of manuring, if it becomes necessary either because of economic factors or shortage of supplies, will no doubt, have its effect on the future productivity of the trees, but is not likely to lead to an early reduction in the local output of rubber.

Our experimental results in fertiliser trials with young Rubber have, on the whole, been disappointing from the aspect of response to manuring, and it is only in the case of phosphoric acid that clear indications of response have been obtained. From another point of view, however, it may be regarded as very encouraging to find that a moderately satisfactory rate of growth has been obtained in unmanured areas on replanted land. For example in our trial at Dartonfield the mean girth of trees in 5 plots manured with an NPK mixture was 8.2 inches whilst the mean girth of those in the unmanured plots was 7.4 inches, at the age of 3 years. Girth increments during the third year amounted to 3.0 inches and 2.7 inches respectively. For the present we recommend the use of a complete mixture with K as the minor constituent, but no undue nervousness would be felt if this ingredient had to be omitted owing to shortage of supplies. If a general curtailment of manuring should become necessary our advice would be to confine applications to backward areas, and to backward trees in areas where the general level of growth is satisfactory.

Sulphur Dusting

I only wish to make a very short reference to this subject. Fears were expressed recently that supplies of sulphur might not be available for use in the next refoliation season, but I understand that a very substantial order has been placed for Java sulphur, and that supplies are likely to be available to meet normal requirements. Our advice to estates in low-country districts remains as before, namely, that estates liable to severe attack should maintain stocks of sulphur, but that dusting should not be undertaken until the first signs of attack are observed. I was recently asked by the Superintendent of a mid-country estate whether sulphur dusting was considered justifiable in view of the present high price of sulphur. My reply was that the price of

rubber was also high, and that estates could probably afford the expense of dusting far better now than they could a few years ago. The incidence of Oidium has been mild during the past two seasons but this should not be allowed to give a false sense of security. The severity of attack depends almost entirely on weather conditions and the disease will, no doubt, return in full force next season if conditions happen to be favourable to the fungus.

That concludes my summary of field problems, and I will deal briefly with a few points relating to factory work.

Coagulants and Other Chemicals

At the outbreak of war local stocks of acetic and formic acid appear to have been about normal, but the expectation of a scarcity led to an unwholesome scramble for supplies, and the inevitable accompaniment of profiteering. Generally speaking estate producers had sufficient reserve stocks to meet their requirements until importers' stocks were replenished, but smallholders and other small producers had to face a severe shortage for several months. One of unfortunate consequence of this shortage was that it encouraged enterprising local traders to market a variety of proprietary substitutes, frequently containing undesirable ingredients and, almost invariably, at prices far in excess of their true value. Our advice is that all proprietary substitutes should be regarded with suspicion, and that no coagulant should be used without knowledge of its composition, intrinsic value, and technical suitability. A leaflet advising against the use of proprietary coagulants will shortly be issued to the 110,000 local smallholders, through the courtesy of the Rubber Controller who has undertaken to distribute them with the next issue of rubber coupons.

Another result of the high price and scarcity of acetic acid was the fraudulent practice of selling diluted acid as pure acid. I am told that much of the acid held by smaller dealers has been diluted. I cannot vouch for that, but samples forwarded to us for test have frequently been found only to contain about 70 per cent acid instead of the normal 98/99 per cent. A simple and useful test for the strength of acetic acid is to add a little petrol. If the two liquids mix the strength of the acid can be considered satisfactory. If they remain in two layers the acid can safely be rejected as diluted. This test does not apply to formic acid.

Supplies of acid (mainly acetic) from alternative sources began to arrive in Ceylon early in 1940, and imports since then have been maintained at a rate in excess of current requirements. According to a rough calculation, based on imports and estimated consumption, stocks now available in the Island should suffice for approximately 8-9 months' requirements, at an export quota of 100 per cent. Just at present there is a scarcity of acid on the market owing to enforcement of the regulation under the Essential Commodities Reserves Ordinance compelling importers to maintain reserve stocks. The reserve when fully established will suffice for 3 to 4 months' requirements, and will provide valuable protection to the industry in case of emergency.

The suitability of pyroligneous acid, prepared by the dry distillation of coconut shells, for use as a coagulant was investigated by the Research Scheme, using material supplied by the Coconut Research Scheme. Our trials showed that rubber coagulated with this product was normal in physical properties, and we were able to report favourably on the value of pyroligneous acid, prepared under suitable control, for use as an emergency coagulant. We were not able to advise its use under normal conditions because of the risk of consumers being prejudiced against Ceylon rubber if it became known that coagulants other than formic and acetic acids were being used. The Department of Industries has since worked out a process for the preparation of a relatively pure form of acetic acid from pyroligneous acid. This product is considered suitable for rubber coagulation, and a factory for the annual production of 100 tons of acetic acid is now under construction. When available, this product will provide a welcome addition to Ceylon's wartime resources.

Care should be taken to economise as far as possible in the use of coagulants, but there is not a great deal which can be done in this direction on the majority of estates. The dosage should be such that only a slightly cloudy serum remains after coagulation. Any excess over this amount is wasteful of acid, whilst a reduction leads to the loss of rubber in the serum. Many small producers roll their coagulum within a few hours of coagulation. Normally we favour this procedure for this class of producer because faults arising from fermentation are avoided. Under wartime conditions, however, overnight coagulation is advisable because a reduction

of about 1/3 can be made in the dosage of acid. The method developed in Malaya for economising in acid, by re-using a part of the serum, has not given favourable results under local conditions and we cannot recommend its adoption except in emergency.

The only other chemical which need be mentioned is sodium bisulphite, which is used in small quantities in the preparation of pale crepe. So far adequate supplies have been available, and it is hoped that this satisfactory position will be maintained. If necessary the dosage can probably be reduced to 4-5 oz. per 100 lbs. dry rubber without serious effect on the colour of the crepe. Care should be taken to avoid the deterioration of the material in opened drums by exposure to the air. It should preferably be transferred to airtight earthenware jars for storage.

Packing of Rubber

For some years prior to the war the practice of shipping rubber in bales had been steadily extending, partly on grounds of economy, but mainly because splinters and nails from damaged chests penetrated into the rubber and caused serious difficulties in manufacturing operations. Several of the large American manufacturers, in particular, insisted on their rubber being shipped from the East in bales. This trend has been greatly accelerated since the outbreak of war, owing to the difficulty of maintaining supplies of plywood chests. Ceylon rubber is now mainly exported in bales wrapped with hessian, whilst shipment in "bare-back" bales, *i.e.*, bales with rubber wrapping sheets, is also extending.

The majority of planters are not directly concerned with the packing of rubber for export, since it is now usual for rubber to be delivered from the estate by lorry, either in open bundles or returnable wrappers, and prepared for export in Colombo. I should like to remind you of the importance of ensuring that your rubber reaches Colombo in clean condition. If the rubber is delivered in open bundles the coir rope used for tying them should be sized to protect the rubber from loose fibres, and the bundles should be well covered with dust sheets in the lorry. Coir or hessian wrappers should also be sized or, preferably, should be used in conjunction with cloth liners. It is possible that petrol rationing will lead to greater use being made of the railway for rubber transport ; if so the protection of the rubber from dirt will require special attention.

Factory Utensils Etc.

Owing to increased output many estates require additional factory equipment, apart from normal replacements. Machinery and metal equipment are naturally difficult to obtain under present conditions, particularly anything constructed in aluminium, such as coagulating tanks, pans, etc. There is little which can be said on this subject except that requirements should be reduced to the minimum, and replacements postponed wherever possible. If new equipment is essential it is probable that substitute materials may have to be accepted, *e.g.*, wooden or tiled coagulating tanks, for sheet manufacture in place of aluminium tanks, and wooden coagulating troughs in place of aluminium pans.

An item on which I would ask you not to economise unduly is wire mesh for straining the latex. It should certainly be made to last as long as possible by careful handling, but it is not a desirable economy to continue to use torn mesh because the price happens to be rather high. One means of economising in the use of mesh is to have several sieve frames of different sizes. When the mesh becomes torn at the edges, which is the usual point of failure, it can be transferred to a smaller frame. We strongly recommend the use of monel or nickel mesh rather than brass mesh, owing to the risk of copper contamination of the rubber arising from contact with brass. Monel mesh has not risen in price to the same extent as brass, it is considerably more durable, and its use is a definite economy.

Under this heading I may also mention the subject of constructional materials. Our standard smokehouse plans, which have been extensively followed in recent years, provided for a steel framed building, corrugated iron roof, and asbestos sheet ceiling. The plan is now being revised on lines providing for the omission of the steel frame, the use of locally made tiles for the roof, and plank ceiling in place of asbestos sheets. Locally available materials should be utilised as far as possible for all constructional work which cannot be postponed.

Before concluding my address I should like to refer very briefly to the effect of the war on the activities of the Research Scheme. Our general policy is to continue our normal programme of research,

subject to special attention being given to any wartime problems which arise, and to the full staff remaining available. The periodical absences of three members of the senior staff on military service have inevitably affected the progress of work but, so far, it has been possible to continue all our main investigations. During the past few months in particular, in the absence of Mr. Murray on leave, the number of advisory visits has had to be reduced to a minimum, and there has sometimes been delay in replying to enquiries when the officer concerned has been away at camp. I can assure you of the best attention being given to advisory correspondence, and must ask your indulgence if replies to enquiries are not always received by return of post. Similarly delays may occur in the issue of publications, due either to our own preoccupations, or to wartime difficulties confronting our publishers.

PLANTING NOTE

TEST FOR ACETIC ACID DILUTION

The grade of acetic acid usually imported for Rubber coagulation is known as glacial acetic acid and is required to contain not less than 99 per cent of pure acetic acid. Though experience has shown that the glacial acetic acid of commerce is a very pure and reliable product instances of adulterated acid being offered for sale are not infrequently encountered in Ceylon. The following simple test is therefore put forward to enable acid users to check the quality of their supplies.

The test is based upon the fact that glacial acetic acid mixes completely with certain organic solvents whereas dilute acetic acid forms two distinct layers. Petrol (motor spirit) is a suitable solvent for the test and is readily available. The test is carried out as follows :—

Stir or shake together approximately equal volumes (say ½ oz.) of acetic acid and petrol in a clean *dry* glass tube or measure such as an acid measuring glass. After allowing the mixture to stand for a few moments note whether the two liquids remain completely mixed or whether they separate into two layers. If they do not separate it may be confidently assumed that the acid is full strength acetic acid. If two layers are formed the strength of the acid is probably less than 96 per cent, and a further examination may be considered desirable.

The test cannot be applied to commercial formic acid.

M. W. P.

MEETINGS

RUBBER RESEARCH SCHEME (CEYLON)

Minutes of the fifty-seventh meeting of the Rubber Research Board held at the Ceylon Chamber of Commerce, Colombo, at 2.30 p.m. on Monday, 21st July, 1941.

Present : Mr. E. Rodrigo (in the chair), Mr. C. E. Jones (Deputy Financial Secretary), Mr. T. Amarasuriya, M.M.C., Mr. J. A. S. Agar, Mr. W. P. H. Dias, J.P., Mr. L. M. M. Dias, the Hon'ble Mr. G. E. de Silva, M.S.C., Mr. T. C. A. de Soysa, Mr. J. D. Farquharson, Mr. R. J. Hartley, Mr. F. A. Obeyesekere, Mr. N. D. S. Silva, O.B.E., J.P., Mr. E. C. Villiers, M.S.C. and Mr. E. W. Whitelaw.

Mr. T. E. H. O'Brien, Director, was present by invitation.

Apologies for absence were received from Messrs. L. P. Gapp, F. H. Griffith, M.S.C., and R. C. Kannangara, M.S.C.

1. Minutes

(*a*) Draft minutes of the meeting held on 21st April, 1941, which had been circulated to members, were confirmed and signed by the Chairman.

(*b*) Matters arising from the minutes :—

Clone Museum at Kepitigalla Estate.—Reported that the Experimental Committee had approved the estimates for replanting 8 acres, as part of the clone museum, at Kepitigalla estate. A sum of Rs. 808-80 was voted to cover the Board's share of the expenditure.

2. Director's Report for 1st Quarter 1941

Oidium Leaf Disease.—A member stated that ordinary grades of dusting sulphur might not be available next year and suggested the issue of a memorandum explaining the relative merits of subs-

titutes such as green sulphur. The Director replied that he understood that supplies of sulphur would be available from Java next year, but would make further enquiries. (It has since been ascertained that a supply of Java sulphur has been ordered by the local Agents). It was further stated that the Research Scheme had assisted in laying out a trial for comparison of green sulphur and yellow sulphur during the last dusting season ; unfortunately, no definite conclusions could be drawn from the trial owing to the mild attack of oidium. It was decided that a further trial should be carried out in 1942.

After further discussion the report was adopted.

3. Export of Latex

Consideration was given to a proposal for the increased commercial production of creamed latex by the Research Scheme, in plant to be provided by the Department of Commerce and Industries. After discussion it was decided that the necessary plant for the monthly production of 3,000 gallons of creamed latex should be installed by the Research Scheme at a cost of Rs. 5,500.

4. Accounts

(*a*) Statement of Receipts and Payments of the Board for the quarter ended 31st March, 1941 was approved.

(*b*) Dartonfield and Nivitigalakele accounts for Februrary, March and April, 1941 were tabled.

(*c*) *Investment in Ceylon Government War Loan.*—The Chairman reported that Rs. 20,000 had been invested in the Ceylon Government 3% War Loan 1956-60.—Approved.

5. Staff

(*a*) *Junior Staff Salaries Committee.*—

The report of a Committee appointed to report on the salaries and terms of service of the junior staff was considered. After discussion and minor amendments, the recommendations for changes in salary scales and leave terms were adopted.

(*b*) Reported that the services of the Geneticist's Laboratory Assistant had been discontinued and that arrangements had been made for the appointment of an Experimental Conductor in his place.

(*c*) Sanction was given for voluntary monthly contributions to War Charities by members of the staff to be collected by deductions from salaries. Deductions should only be made on the written application of each officer.

6. Experimental Committee

Recommendations made at a meeting of the Experimental Committee held on 23rd June, 1941.

(*a*) *Buildings.*—The following votes were approved :—

1.	Repairs to tool shed at Nivitigalakele	Rs. 200
2.	Erection of dhoby house at Dartonfield (Subject to payment of rental by dhoby at Rs. 10 per month).	Rs. 2,000

(*b*) *Purchase of Clonal Seeds.*—A sum of Rs. 1,500 was voted for the purchase of clonal seeds from the Nederlands East Indies.

(*c*) *Manuring Trials on Estates.*—After discussion it was decided that yield recording in the manuring trial in mature Rubber at Dartonfield should be placed on a monthly sampling basis in 1942, and that the services of the conductor in charge of the experiment should be utilised to carry out three similar experiments on outside estates in different districts.

(*d*) The Visiting Agent's report on his inspection of the Board's estates on May 15th, was adopted.

7. Smallholdings Committee

Recommendations made at a meeting of the Smallholdings Committee held on 3rd June, 1941.

Coagulants.

(*a*) Decided to issue a leaflet to all smallholders, advising against the use of proprietary coagulants. It was reported that the Rubber Controller had kindly undertaken to distribute the leaflets with the next issue of rubber coupons.

(*b*) Decided to arrange that acetic acid in sealed bottles supplied by "approved" suppliers to "approved" dealers should bear special labels issued by the Research Scheme.

8. Conference of Directors in Java

Reported that the Director had been invited to attend a conference of Directors of Rubber Research organisations in the East, which would probably be held in Java in November, 1941. The Director was authorised to attend the Conference, subject to the international situation remaining satisfactory.

9. Publications

The handbook entitled "The Identification of Ceylon Clones of *Hevea Braziliensis*" was tabled.

The meeting terminated with a vote of thanks to the Chamber of Commerce.

Research Laboratories,
Dartonfield, Agalawatta,
31st July, 1941.

PILMOOR CLONES

BUDWOOD & BUDDED STUMPS

ORDERS BOOKED IN ROTATION

PRESENT PRICES

(ex Estate)

Budwood—per yard.

		Pilmoor B/84	Pilmoor D/65	Pilmoor A/44 or B/58
First	100 yards	Rs. 5/-	Rs. 2/50	Rs. 1/50
Next	100 ,,	,, 3/80	,, 1/90	,, 1/-
Next	300 ,,	,, 3/-	,, 1/50	-/75
Next	500 ,,	,, 2/50	,, 1/25	-/60
Above	1,000 ,,	,, 2/-	,, 1/-	-/50

(Minimum quantity: 3 yards)

Budded Stumps—per stump.

		Pilmoor B/84	Pilmoor D/65	Pilmoor A/44 or B/58
First	100 stumps	-/60	-/30	-/25
Next	100 ,,	-/50	-/25	-/20
Next	300 ,,	-/40	-/20	-/15
Next	500 ,,	-/35	-/15	-/10
Above	1,000 ,,	-/30	-/15	-/10

(Minimum quantity: 20 stumps)

PILMOOR CLONAL SEEDS

ORDERS BOOKED FOR IMPORTATION OF CLONAL SEEDS OF 1942 CROP.

WHITTALL & CO.

London Advisory Committee for Rubber Research (Ceylon and Malaya).

Member nominated by the Colonial Advisory Council of Agriculture and Animal Health:

Dr. H. A. Tempany, C.B.E.

Member nominated by the Government of Ceylon:

Mr. F. P. Jepson.

Member nominated by the Governments in British Malaya:

Mr. J. Lornie, C.M.G.

Members representing Malayan Planting interests—nominated by the Rubber Growers' Association:

Mr. P. J. Burgess (Chairman).
Mr. J. L. Milne.
Mr. Eric Macfadyen.

Members representing Ceylon Planting interests—nominated by the Rubber Growers' Association:

Mr. G. H. Masefield.
Mr. George Brown
Mr. H. W. Horner.

Member representing Manufacturing interests:

Lieutenant-Colonel J. Sealy-Clarke.

Ex-Officio Members:

Sir H. A. F. Lindsay, K.C.I.E., C.B.E., Director of the Imperial Institute.
Professor V. H. Blackman, Director of the Botanical Laboratories, Imperial College of Science and Technology.
Dr. S. P. Wiltshire, Director of the Imperial Mycological Institute.
Sir John Russell, O.B.E., Director of the Rothamsted Experimental Station.

Secretary:

Mr. J. A. Nelson, B.Sc.

The Technical Sub-Committee consists of members of the Advisory Committee with the following co-opted Members:

Mr. G. Martin (Superintendent of Rubber Investigations).
Mr. G. E. Coombs.
Mr. G. G. Balazs.
Mr. H. N. Ridley
Dr. Samuel Pickles
Dr. H. P. Stevens
Dr. D. F. Twiss
Prof. R. G. H. Clements

STAFF.

Mr. G. Martin, B.Sc. A.I.C., F.I.R.I.
Mr. H. C. Baker, M.Sc., A.I.C., A.I.R.I,
Mr. W. G. Wren, B.Sc., A.R.C.S.

RUBBER RESEARCH SCHEME (CEYLON)

LIST OF PUBLICATIONS FOR SALE

Bulletin No. 1-20. Bound volume, **Rs. 5·00. Later Bulletins Re.1·00** per copy

No, 1.	The Effect of Tapping on the Movements of Plant-Food in *Hevea Braziliensis*	
No. 2.	The Effect of Tapping on the Movements of Plant-Food in *Hevea Braziliensis*	
No. 3.	Seasonal Variations in the Movements of Plant-Food in *Hevea Braziliensis*, Part I.	
No. 4.	The Physiological Effects of Various Tapping Systems, Part I.	
No. 5.	Progress Report on Vulcanization Tests.	
No. 6.	The Physiological Effects of Various Tapping Systems, Part II.	
No. 7.	The Physiological Effects of Various Tapping Systems, Part III.	
No. 8.	Seasonal Variations in the Movements of Plant-Food in *Hevea Braziliensis*, Part II.	
No. 9.	Vulcanization Tests.	
No. 10.	Vulcanization Tests.	
No. 11.	Variability in Rubber Manufacture	
No. 12.	Progress Report of the Rubber Research Chemist.	
No. 13.	Vulcanization Tests.	
No. 14.	On the Variation in the Number of Latex Vessels present in *Hevea Braziliensis*	
No. 15.	Vulcanization Tests.	
No. 16.	On the Natural Clotting of Rubber Latex.	
No. 17.	Vulcanization Tests.	
No. 18.	Measurements of " Bark Renewal"	
No. 19.	Vulcanization Tests	
No. 20.	Vulcanization Tests	
No. 21.	Vulcanization Tests	1919
No. 22.	Vulcanization Tests	1919
No. 23.	Vulcanization Tests	1920
No. 24.	Valcanization Tests	1920
No. 25.	Investigations on Samples of Plantation Para Rubber from Ceylon.	1921
No. 26.	Result of Trials of Ceylon Plantation Rubber for the Manufacture of Ebonite	1921
No. 27.	Investigations on Samples of Plantation Para Rubber from Ceylon.	1921
No. 28.	Investigations on Samples of Plantation Para Rubber from Ceylon.	1922
No. 29.	Summary of the Principal Results Obtained from Investigations into the Properties of Ceylon Plantation Rubber in Relation to its Method of Preparation.	1922
No. 30.	The Penetration of Disinfectant on the Tapping Cut of *Hevea Braziliensis*	1922
No. 31.	On the Occurrence " of Rust " on Sheet Rubber.	1923
No. 32.	On the Preservation of Latex.	1924
No. 33.	Investigations on Samples of Plantation Para Rubber from Ceylon.	1924
No. 34.	Investigations on Samples of Plantation Para Rubber from Ceylon.	1924
No. 35.	Investigations on Samples of Plantation Para Rubber from Ceylon.	1924
No. 36.	Investigations on Samples of Plantation Para Rubber from Ceylon.	1924
No. 37.	Investigations on Samples of Plantation Para Rubber from Ceylon	1924
No. 38.	Investigations on Samples of Plantation Para Rubber from Ceylon.	1925
No. 39.	Do (Final Report Series I)	1925
No. 40.	Do Series II	1926
No. 41.	Do First Interim Report on Artificial Ageing Tests.	1926
No. 42.	On the Smoking of Sheet Rubber in Relation to Mould Prevention.	1926
No. 43.	The Inter-Relationship of Yield and the Various Vegetative Characters in *Hevea Braziliensis* (out of print).	1926
No. 44.	The Construction of Smokehouses for Small Rubber Estates (out of date	1926
No. 45.	The Efficiency of Disinfectants and Fungicides.	1927
No. 46.	The Control of Bark Rot by Disinfectants.	1927
No. 47.	Report on Variability of Ceylon Estate Grades	1927
No. 48.	Brown Bast and its Treatment.	1928
No. 49.	Report on Causes of Variation in Plasticity.	1928
No. 50.	Crepe Rolling.	1929
No. 51.	The Curing of Sheet Rubber.	1930
No. 52.	The Preparation of Uniform Rubber.	1932
No. 53.	Oidium Leaf Disease	1936
No. 54.	Report on a Visit to Malaya, Java and Sumatra.	1937

Booklets at Rs, 2-50 per copy.

Guide to the Preparation of Plantation Rubber. By T. E. H. O'Brien, M. Sc., A.I.C., Chemist

The Budding of Rubber. By R. A. Taylor, B.Sc., Physiological Botanist (out of date)

Diseases of Rubber in Ceylon, By R. K. S. Murray, A.R.C.Sc., Mycologist.

Copies of the following publications of the Rubber Research Institute of Malaya are available at the prices indicated :—

Planting Manual No. 4—Latex Preservation and Shipment. **Rs, 3-50**